Remarks:

This amendment is submitted in an earnest effort to advance this case to issue without delay.

The specification has been amended to eliminate some minor obvious errors. No new matter whatsoever has been added.

The drawing has been amended to schematically show the various claimed means.

Main apparatus claim 1 and method claim 14 have been replaced with US-style apparatus claim 24 and method claim 25, respectively also includign the features of original claims 9 and 14, which have been canceled. The other claims have been amended to better comply with US format and overcome the §112 rejections.

Transmitted herewith is a PTO-1449 listing the references cited in the International Search Report filed with the original application papers, or US equivalents thereof. Since US 5,996,683 appears to be awol from the USPTO database, a copy is supplied. Copies of all cited foreign references are also supplied.

New apparatus claim 24 and method claim 25 are of identical scope and use the same terminology. Claim 24 describes,

as shown in FIGS. 1 and 2, a rotating regenerative heat exchanger comprising:

a heat-exchange rotor 3 rotatable about an axis and having axially oppositely directed front and rear end faces 12 and 13 and an outer periphery;

a housing 1 surrounding the rotor 3 and defining a first flow sector 4 for axial front-to-rear flow 5, 6 through the rotor 3 of air from the exterior and, angularly offset from the first sector a second flow sector 7 for axial rear-to-front flow 8, 9 through the rotor 3 of air to the exterior;

means 24 for pressurizing the housing 1 around the periphery of the rotor 3 with housing air at a superatmospheric pressure;

front and rear separators 19 and 20 fixed in the housing 1, juxtaposed with the respective end faces 12 and 13 of the rotor 3, and extending diametrally of the rotor 3 between the sectors; and

means 24 for projecting sealing air from the separators 19 and 20 and thereby preventing mixing of air between the sectors.

Thus with this system pressurized separators are provided between the inflow sector 4 and the eoutflow sector 7. The examiner's statement that in EP 0,588,185 (US 5,577,551) of

Kritzler there are "airflow separation devices (16) arranged running diametrically at the end faces of the rotor (3) between the two flow sectors" is correct, but the examiner's statemnt that they are "connected t o the housign and able to be suplied with a rinsing airflow" is not. Instead the only discussion of these elements 16 is in the paragraph starting in column 5 at line 28 of EP '185, which is translated below:

> "The peripheral seals 9 and the radial seals 16 are elastic, that is resiliently pressed agzinst the rotor. To this end the peripheral seals 9 have on both the hot and cold faces 7 or 8 of the rotor several actuation points 17 for manual or full-automatic operation; respective large regions of the peripharal seal are each associated with a single actuating point 17 from which a lever 18 extends to the seal. It is thus possible from a few actuation points 17 to act on the entire peripheral seal as needed. In order to press the radial seals 16 there are at separation zones 14 closed radial chambers 15 forming setting springs 19 (see FIG. 1)."

Thus there is no pressurization of these elements or projection of air from them. No rejection of claims 24 and 25 on Kritzler is possible.

Similarly US 4,062,129 of Yoshida some diametral structure is shown in FIG. 4, but it is not discussed or provided

with a reference numeral, and appears to be a solid metal bar or plate. Ther is no suggestion to blow sealing air from it. Thus this reference is cumulative to Kritzler.

EP 0,297,230 of Lautner has a schematic representation of different flow zones, but there does not appear to be anything resembling a separator blowing in air. Elements 44 is identified is an "outside-air blower," and presumably elements 14, 16, and 46 are also blowers. There is nothing resembling the blowing separators of this invention.

Thus the inventive feature is not shown in any of the applied references, making a §102 rejection impossible. Since there is no showing of it, it would not be obvious to add it, also making a §103 rejection impossible.

All claims are therefore allowable. Notice to that effect is earnestly solicited.

If only minor problems that could be corrected by means of a telephone conference stand in the way of allowance of this

case, the examiner is invited to call the undersigned to make the necessary corrections.

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Enclosure: Marked Specification
Clean Specification
Replacement Drawing (2 sheets)
PTO-1449

*ROTATING HEAT EXCHANGER AND METHOD FOR SEALING THE SAME*

## CROSS REFERENCE TO RELATED APPLICATIONS

This application is the US national phase of PCT application PCT/EP2004/005416, filed 19 May 2004, published 23 December 2004 as WO2004/111563, and claiming the priority of German patent application 10327078.7 itself filed 13 June 2003, whose entire disclosures are herewith incorporated by reference.

## FIELD OF THE INVENTION

The invention relates to a rotating heat exchanger with a rotatably mounted rotor ~~, which has~~ having a first flow sector for external and supply air and a second flow sector for exhaust and venting air, through which [[it]] air runs upon rotating, and a housing ~~which encloses~~ surrounding the rotor at its periphery, and to a method for the sealing of such a rotating heat exchanger. Thus external air flows from the outside through the rotor in the first sector to a user and then exhaust air from the user flows back through the rotor in the second sector and is vented.

## BACKGROUND OF THE INVENTION

With known rotating heat exchangers of this kind, peripheral seals are provided between the rotor and the housing enclosing it at the front end face of the rotor and at the rear end face of the rotor, by means of which peripheral seals the exit of air from the airflow [[s]] flowing through the rotor into the housing is to be prevented. Since the rotor rotates with respect to the housing enclosing it, considerable leaks between the rotor on the one hand and the housing on the other hand always occur during the operation of a rotating heat exchanger of this kind, which can lead to air from the airflows flowing

through the rotor exiting from the rotor. This can lead to the supply air for a room made available by the rotating heat exchanger becoming undesirably contaminated.

## OBJECT OF THE INVENTION

The problem underlying the invention is to develop a rotating heat exchanger and a method for sealing one such rotating heat exchanger in such a way that such leaks in an undesired direction can no longer take place.

## SUMMARY OF THE INVENTION

This problem is solved according to the invention by the fact that the housing enclosing the rotor at its periphery is filled with housing or sealing air, and that the pressure of the housing or sealing air is higher than the pressure of the airflow ~~s flowing~~ through the rotor. As a result of the pressurization of the housing with housing or sealing air under excess pressure, the pressure level in the housing is always kept above the pressure level of the airflow [[s]] flowing through the rotor of the rotating heat exchanger. It is thus possible to prevent external and supply air being mixed with exhaust and venting air through the housing.

Furthermore, in the case of the rotating heat exchanger according to the invention, peripheral seals can obviously also be provided, by means of which the housing or sealing airflow can be reduced. Such peripheral seals can be fixed in an advantageous way on the housing of the rotating heat exchanger.

The pressure of the housing or sealing air can be kept at a constant pressure level. It must be taken into account here that this constant pressure level lies above the pressure level

of the airflow [[s]] flowing through the rotor of the rotating heat exchanger.

Alternatively, it is possible to keep the pressure of the housing or sealing air above the pressure of the airflow [[s]] flowing through the rotor by a constant differential pressure. With this mode of procedure, the amount of housing or sealing air by means of which the housing must be pressurized can be optimized, whereby a sufficient excess pressure is always present inside the housing.

The excess pressure inside the housing can be produced to advantage by means of an external or internal pressure source.

According to an advantageous embodiment, the rotating heat exchanger according to the invention includes a control and regulating device, by means of which the operation of the pressure source can be controlled and regulated according to the signal of a pressure sensor measuring the pressure in the housing and/or a pressure sensor measuring the airflow [[s]] flowing through the rotor. Accordingly, the pressure level of the housing or sealing air in the housing is controlled or regulated in dependence on the pressure level in the housing, which is based on a set-point pressure, and/or the pressure level of the airflow [[s]] flowing through the rotor.

Especially in places of use and cases of application in which there are present in the exhaust or venting air charges and compositions which can give rise to a risk of explosion for example, it is advantageous for the housing to be pressurised with non-critical housing or sealing air, because then the critical contents of the exhaust or venting air can be diluted, so that the explosion protection can be dispensed with, for example, in the combustion areas for driving motors.

According to an advantageous embodiment of the rotating heat exchanger according to the invention, airflow separation devices are provided running diametrically at the end faces of the rotor between the two flow sectors, said airflow separation devices being connected to the housing and able to be supplied with a sealing airflow by means of the housing or sealing air present in the housing. A fan, which is otherwise required for the airflow separation devices, can be dispensed with in the case of the rotating heat exchanger according to the invention. If a ~~rinsing~~ <u>purging</u> wedge-like device, which is connected to the housing and able to be supplied with a ~~rinsing~~ <u>purging</u> airflow by means of the housing or sealing air present in the housing, is provided at the end face of the rotor in the region of the flow sector for the exhaust and venting air that is arranged - in the rotary direction of the rotor - directly before the flow sector for external and supply air, it is also possible to dispense with a separate fan for supplying the ~~rinsing~~ <u>purging</u> wedge-like device. If the rotating heat exchanger according to the invention is provided according to an advantageous development with a temperature-regulating device, by means of which the housing or sealing air can, e.g. for the purpose of anti-icing, be temperature-regulated, any icing on the peripheral seals can be prevented, whereby the formation of condensate in the housing can also be eliminated. The housing or sealing air can be taken in a straightforward manner from the supply and/or external air system of the rotating heat exchanger.

To advantage, nozzle<u>s</u> ~~devices~~ are provided on the housing of the rotating heat exchanger according to the invention, through which nozzle<u>s</u> ~~devices~~ housing or sealing air can be directed onto a bearing of the rotor. As a result, the

bearing of the rotor can be kept dry with relatively little outlay.

## BRIEF DESCRIPTION OF THE DRAWING

The invention will be explained below in greater detail with the aid of an embodiment, reference being made to the drawing. In the figures:

FIG. 1 shows a view of a rotating heat exchanger designed according to the invention; and

FIG. 2 shows a schematic representation of airflows ~~flowing~~ through a rotor of the heat exchanger according to the invention and of sealing and ~~rinsing~~ purging airflows with a rotating heat exchanger designed according to the invention.

## SPECIFIC DESCRIPTION

A rotating heat exchanger 1 according to the invention shown in perspective view in FIG. 1 has a housing 2 approximately square in terms of its external contour in the embodiment shown.

Housing 2 encloses a rotor 3 of rotating heat exchanger 1 at the periphery of the former.

Rotor 3 has a first flow sector 4 [[,]] through which external air 5 and supply air 6 flows, as can be seen from FIG. 2. The airflow for external air 5 and supply air 6 is represented by arrows in FIG. 2.

Furthermore, rotor 3 has a second flow sector 7, through which exhaust air 8 and venting air 9 flows in the opposite direction to external air 5 and supply air 6. The airflow formed by exhaust air 8 and venting air 9 is also shown by arrows in FIG. 2.

Rotor 3 of the rotating heat exchanger is arranged so as to be rotatable about a bearing or a hub 10. The direction of rotation of rotor 3 is shown by arrow 11 in FIG. 1 and FIG. 2.

Housing 2 is connected to a pressure source not shown in FIGS. 1 and 2, by means of which housing 2 is pressurised with housing or sealing air, and more precisely at a pressure which is higher than the pressure level in airflows 5, 6; 8, 9 flowing through rotor 3. As a result, radial outflow ~~an exit~~ of exhaust air 8 or venting air 9 from rotor 3 ~~in the radially outward direction~~ is prevented. Correspondingly, radial inflow ~~an exit~~ of external air 5 and supply air 6 from rotor 3 ~~in the radially inward direction~~ is also prevented. Sealing airflow 12 represented by arrows [[12]] and running radially inward with respect to rotor 3 enters into the airflow formed by external air 5 and supply air 6 and the airflow formed by exhaust air 8 and venting air 9. A controlled chamber air seal for rotating heat exchanger 1 is created, as it were, by housing 2 which is under excess or superatmospheric pressure.

Peripheral seals 15, 16 are provided respectively between the periphery of rotor 3 and front [[side]] wall 13 of housing 2 enclosing rotor 3 and correspondingly provided rear [[side]] wall 14 of housing 2, by means of which peripheral seals ~~the leaks~~ leakae between housing 2 on the one hand and rotor 3 on the other hand, which necessarily occur during the operation of rotating heat exchanger 1, are to be the kept as small as possible.

These peripheral seals 15, 16 are expediently fixed at front [[side]] wall 13 and at rear [[side]] wall 14 of housing 2, so that the external periphery of rotor 3 moves with respect to these peripheral seals 15, 16.

The pressure of the housing or sealing air inside housing 2 is either kept at a constant pressure level, whereby this pressure level is selected in such a way that ~~, at all~~

~~events, it lies~~ it is always above the pressure level of airflows 5, 6; 8, 9 flowing through rotor 3. Alternatively, it is possible to control and regulate the pressure of the housing or sealing air inside housing 2 in such a way that this pressure always lies above the pressure level in airflows 5, 6; 8, 9 flowing through rotor 3 by a predeterminable differential pressure.

An external or an internal pressure source such as shown schematically at 24 in FIG. 1 can be provided as a pressure source.

By means of a control and regulating device [[not]] shown schematically at 25 in the figures, which includes a pressure sensors 26 (only one shown) arranged in housing 2 and a pressure sensor detecting the pressure in external air 5 and supply air 6 and in exhaust air 8 and venting air 9. The pressure inside housing 2 is controlled or regulated according to the signals of these pressure sensors 26. A set-point pressure inside housing 2 or a differential pressure between the pressure in housing 2 and the pressure inside airflows 5, 6; 8, 9 can be used as a target magnitude.

If at least one airflow that is critical from the composition standpoint flows through rotor 3 of rotating heat exchanger 1, ~~it is expedient for~~ the housing 2 needs to be pressurized with non-critical housing or sealing air. Said critical airflow can be diluted by means of this non-critical housing or sealing air, in such a way that the risks resulting from the composition of the critical airflow, e.g. risk of explosion, are reduced.

An airflow separation device 19 and 20 extending horizontally and diametrically over rotor 3 is provided

respectively at two end faces 17, 18 of rotor 3. The two airflow separation devices 19, 20 are designed, as it were, as central crosspieces, the interior space whereof communicates with the interior space of housing 2, so that the two airflow separation devices 19, 20 are pressurized by the source 24 with housing or sealing air under excess pressure. There emerges from the two airflow separation devices 19, 20 a sealing airflow shown by arrows 21, by means of which mixing of external air 5 and venting air 9 is prevented at end face 17 of the rotor and mixing of supply air 6 and exhaust air 8 is prevented at end face 18 of rotor 3.

Furthermore, a ~~rinsing~~ purging wedge-like device 22 is arranged at end face 17 of rotor 3 beneath airflow separation device 19. The ~~rinsing~~ purging wedge-like device directs a ~~rinsing~~ purging airflow shown by arrows 23 through rotating rotor 3, so that co-rotating air from second flow sector 7, which is assigned to exhaust air 8 and venting air 9, is prevented from passing into first flow sector 4 of rotor 3, which is assigned to external air 5 and supply air 6. With the rotating heat exchanger shown in FIGS. 1 and 2, ~~rinsing~~ purging wedge-like device 22 is connected - like the two airflow separation devices 19, 20 - to housing 2, so that ~~rinsing~~ purging airflow 23 is also fed through housing or sealing air from housing 2.

Furthermore, rotating heat exchanger 1 shown in FIGS. 1 and 2 is equipped with a heating device not shown in the figures, by means of which the housing or sealing air can be heated. In the case of certain requirements, however, it may also be expedient generally to provide a temperature-regulating device or controller 27 [[,]] by means of which the temperature of the housing or sealing air inside housing 2 can be

temperature-regulated at will. The aforementioned heating device is especially expedient when icing of rotating heat exchanger 1 is to be prevented in the presence of certain temperature conditions.

The housing or sealing air can be taken from the supply air system or the external air system of rotating heat exchanger 1.

Housing 2 can be provided with nozzles ~~devices~~, not shown in FIGS. 1 and 2, through which bearing or hub 10 of rotor 3 of rotating heat exchanger 1 can be kept dry. This is of special importance particularly in the case of rotating heat exchangers 1 in which airflows 5, 6; 8, 9 flowing through rotor 3 are subjected to humidity.